

Qotho CRM-1-236 - Ferrochrome

SUMMARY

The application note summarizes the digestion of QCRM-1-236, a Ferrochrome Certified Reference Material using ColdBlock™ Digestion Pro Series Technology.

Instrument:	ColdBlock CBM sample digester, chiller, HF inserts, ICP-OES
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Digestion Time:	95.5 minutes
Acid Used:	H ₂ SO ₄ , HNO ₃ , HF
Average ColdBlock Recovery vs. CRM:	<ul style="list-style-type: none"> • 61% Aluminum • 101% Chromium • 105% Iron

METHODOLOGY

1. The chiller temperature was set to -5 °C.
2. Approximately 0.100 g of each sample was accurately weighed and transferred into a ColdBlock digestion vessel.
3. A reagent mixture of 20 mL 5 % H₂SO₄ v/v and 2 mL HF was added to each vessel.
4. Samples were digested at 100 % power for 5 minutes, followed by 50% power for 80 minutes.
5. An additional 5 mL HNO₃ was introduced to each vessel.
6. Samples were further digested at 40 % power for 10 minutes, followed by 100 % power for 30 seconds.
7. Digestates were allowed to cool, then quantitatively diluted to a final volume of 50mL using a solution of 2 % HNO₃ v/v.

DISCUSSION

- An optional addition of boric acid (20mL of 4% v/v H₃BO₃) can be used to complex residual fluoride ions, which stabilizes the solution and enables safe analysis on sample introduction systems that are not equipped with inert HF kits.
- The inclusion of boric acid did not enhance the recoveries of aluminum or magnesium.



RESULTS

QCRM-1-236 - Ferrochrome Powder									
Element	Certified Value (wt.%)	+/-	Sample A	Sample B	Sample C	Averag (wt.%)	Stdev	RSD	Recovery
Al	2.43	0.14	1.48	1.44	1.49	1.47	0.023	1.6%	61%
Co	0.047	0.002	0.047	0.045	0.046	0.046	0.001	1.5%	98%
Cr	40.74	0.23	41.25	40.48	41.61	41.11	0.58	1.4%	101%
Fe	29.46	0.36	31.31	30.42	31.20	30.98	0.49	1.6%	105%
Mg	1.72	0.20	1.21	1.20	1.20	1.20	0.002	0.1%	70%
Mn	0.38	0.01	0.40	0.39	0.40	0.39	0.007	1.8%	104%
Ni	0.139	0.002	0.14	0.15	0.14	0.14	0.003	2.2%	103%
Si	6.46	0.07	6.51	5.95	6.10	6.19	0.291	4.7%	96%
Ti	0.45	0.01	0.45	0.44	0.44	0.45	0.01	1.3%	99%
V	0.27	0.01	0.26	0.25	0.26	0.26	0.005	0.02	96%

Qotho Minerals (Pty) Ltd (2022). QCRM-1-236 Ferrochrome Certified Reference Material, Certificate of Analysis. South Africa.